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with any telescope, paper ruled in squares with four divisions to the inch, is very useful and convenient, and by reducing the projected image of the sun to a circle eight inches in diameter (the size of the cardboard discs), the value of each of these small divisions will be nearly $61''$ of arc, or 27.075 miles in length at the sun's mean diameter; or, what amounts to the same thing, the value of 2° of linear measurement on the equator, as shown on the discs, will be 15.115 miles.

And now, having, if with some unavoidable egotism, as briefly and simply as possible, explained *how* to look at the sun and how we may see whatever is to be seen at any time on his surface, I will, in conclusion, venture to impress one or two maxims on all beginners. In the first place, if you would work to any purpose, expect at the outset, beyond the pleasure of being at work, few definite results; look for no great or stirring discoveries; be prepared for long periods when there will be little or nothing to record; but persevere. Make solar work part of your daily work; draw constantly what you see—to do this alone requires a long-practised eye and hand—note accurately the times of observation; above all things, only draw *what* you see. Faithful drawings from different localities, correctly marked as to date, instrument and powers employed, will be a welcome contribution to the directors of all good observatories. Your own interest will increase year by year. The history of a single group of spots, or faculæ, will have its variations and excitements, and *may* have its distinct scientific value. But remember if "Art is long," Science is slow. It only desires the truth. It waits for it; it finds in patient watching the reward of that satisfaction which all methodical and no desultory work gives. It is worth the labor involved, and the laborer who once begins to cultivate his field will rarely, if ever, leave it in disappointment or disgust.

Cirencester, England, February 12, 1891.

THE SOLAR ECLIPSE OF JUNE 6, 1891.

By Orrin E. Harmon.

The writer has computed the phases of this eclipse for four different places in the State of Washington, as follows: Olympia, Blaine, Walla Walla and Spokane Falls.

These places are situated so that predictions for them will serve to give a correct idea of the phases of the eclipse for the State generally.

The duration of the eclipse throughout the State is about $1^h\ 50^m$, except at Blaine, where it lasts $1^h\ 53^m$.

The general phases are as follows:

	BEGINS.	ENDS.
Olympia, -	$6^h\ 21^m\ 45^s$	$8^h\ 12^m\ 02^s$
Blaine, - -	$6^h\ 22^m\ 44^s$	$8^h\ 16^m\ 28^s$
Spokane Falls,	$6^h\ 24^m\ 34^s$	$8^h\ 14^m\ 56^s$
Walla Walla,	$6^h\ 19^m\ 41^s$	$8^h\ 10^m\ 19^s$

These results are given in Pacific Standard Time, and the latitudes and longitudes of the several places were assumed to be as follows:

	LATITUDE.	LONGITUDE.
Olympia, -	47° 00′	$8^h\ 11^m\ 40^s$
Blaine, - -	49° 00′	$8^h\ 11^m\ 00^s$
Spokane Falls,	47° 40′	$7^h\ 49^m\ 40^s$
Walla Walla,	46° 00′	$7^h\ 53^m\ 20^s$

The magnitude of the eclipse is as follows, the sun's diameter being taken at unity:

Olympia, - .51; Blaine, - .55;
Spokane Falls, .47; Walla Walla, .47.

These calculations were made by taking out the places of the sun and moon for some assumed time, supposed to be within a few minutes of the beginning and ending of the eclipse. The primary rule to take out the places of the sun and moon for the hours immediately before and after the time of conjunction, does not hold well in this case on account of the moon's large parallax in right ascension. The moon's hour angle being about six hours at the time of beginning, the parallax throws the moon's apparent place east of the sun's at this time; and the relative path of the moon across the sun's disc thus deduced, will be quite inaccurate. But by taking out the places of the sun and moon for 2^h and 4^h, Greenwich mean time, and computing the parallaxes in R. A. and Dec. for these hours, the moon's path, and consequently the time of beginning and ending of the eclipse, can be quite accurately deduced for any Pacific Coast Meridian. In the above cases the selected times for calculating the moon's path were $2^h\ 21^m$ and $4^h\ 12^m$, Greenwich mean time, this being very nearly the times of beginning and ending for Olympia.

The writer also computed the phases of this eclipse for Mt. Hamilton, California, by the above method, with the following results, in Pacific standard time:

Begins, $6^h\ 09^m\ 41^s$, A. M.
Ends, $7^h\ 46^m\ 54^s$, A. M.

CHEHALIS, LEWIS COUNTY, WASHINGTON, March 14, 1891.

ON THE THERMOMETRIC CHRONOMETER OF THE LICK OBSERVATORY.

BY A. O. LEUSCHNER.

The so-called thermometric chronometer (C. FRODSHAM & Co., 0008), of the Lick Observatory, is neither always a sidereal chronometer, nor does it always give mean solar time. It differs from other chronometers, inasmuch as it has no compensation whatever. Accordingly, the slightest change of temperature will produce a perceptible change in its daily rate. In February, 1889, when the first determinations of the rate of this chronometer were made for the purpose of finding its temperature coefficient, it gained on mean solar time in the neighborhood of six minutes per day, or about two minutes on sidereal time. In June, however, owing to the gradual increase in temperature, it was *losing* on sidereal time about three minutes per day. At this point the observations were discontinued, as the material on hand was deemed sufficient for the purpose of finding the temperature-coefficient.

I shall not here attempt to give a complete discussion of the investigations, for the final results have not, as yet, been attained, but, complying with a request of Professor HOLDEN, who thinks that the members of our Society may be interested to learn something about the odd behavior of uncompensated chronometers, I shall roughly sketch the nature of the preliminary reductions, and state the approximate results thereby obtained.

As it happened that during the winter just passed I had to conduct the practical exercises of a class in "Least Squares," I thought that the class might profit by a reduction of my observations, although there are other and simpler methods, by means of which approximations to the temperature-coefficient might have